FACTORS IN ECONOMIC DEVELOPMENT: AN EMPIRICAL ANALYSIS

by

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CHAPTER I

INTRODUCTION

With the widening economic gap between developed and underdeveloped nations and the emergence of newly independent nations, the problem of economic development is attracting more and more attention.

Underdeveloped nations[1] are now turning their attentions to economic development as a source of internal stability and as a method of insuring their independence. No longer are underdeveloped nations willing to accept low national output as inevitable or something they have no control over. Today, underdeveloped nations see low national output as a handicap, a handicap which prevents their people from enjoying greater control over their environment.

Underdeveloped nations are now putting their reliance on development programs which they feel will remove the obstacles to their development:

1. Lack of Capital.
2. Underskilled, Underemployed Labor Force.
3. Tradition Bound Institutions.
4. Large Agricultural Sectors Using Outmoded Technology.
5. High Consumption - Little Savings.
6. Lack of Exploitable Business Opportunities.
7. Lack of Innovation.
8. Export Sector that Faces Low Elasticity of Demand for its Products.

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[1]An underdeveloped nation in this study will be those nations which have a per capita income of $600 or less.

The developed nations of the world are taking a more active interest in helping underdeveloped nations remove the major obstacles to their development. Developed nations are supplying aid in the form of capital and technical assistance. Countries such as Great Britain are adopting most favored nations policies, allowing exports of underdeveloped nations to cross their borders at reduced tariff rates.

The extent to which this aid from developed countries will remove the major obstacles to development will depend on the individual country. Because underdeveloped nations may vary with respect to the problems they face, general purpose tools of economic development must be used with care in outlining courses of action to be taken in promoting development.[2] In order to help solve the problem of which courses of action should be taken, recent studies done by Professors Harbison and Myers and Professors Adelman and Morris have attempted to discover empirically the relationship between different factors and per capita GNP. In the Harbison and Myers study, it was found that a high correlation existed between the human resource development of a nation and its GNP. Professors Adelman and Morris, in their study, found that 66% of differences in GNP of various countries could be explained not by economic factors, but by non economic factors such as changes in attitudes and institutions, strength of the political system, character and nature of leadership, and stability of social and political environment.

Purpose and Objectives

The purpose of this study is to consider some of the factors which have been deemed important in the development process and to see if there is some

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[2]Peter T. Bauer and Basil S. Yamey, The Economics of Underdeveloped Countries (Chicago: University of Chicago Press) p. 8.

correlation between their presence and the level of GNP for a country. The objectives of the study are:

1. To determine if there exists a correlation between the presence of the selected factors and per capita GNP of a country.
2. To determine whether the selected factors that had high correlations in the lesser developed regions had high correlations in the more developed regions.
3. To determine whether certain patterns of change of selected factors accompanied growth.

Scope and Method of Study

The problem of economic development is not confined to any one region or area of the world. Because the problem of economic development is a world-wide problem, the task of finding a relationship between factors that might promote growth is a difficult task. To simplify this task, the countries used in this study were grouped geographically into four regions: Latin America, Africa, Middle East, and Asia.

To determine whether there existed a correlation between GNP and the presence of a characteristic in a particular region, rank correlation was used.

Rank correlation was used in the study because it depended only on the ability to distinguish different magnitudes and not on precise calculation, and therefore lent itself quite readily to the task of determining correlations between chosen factors, which differed in reporting dates and definitions, and levels of per capita gross national product.[3]

The variables chosen were those considered to be prime movers in economic development by various writers. When there was no method of directly measuring

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[3]Frederick E. Croxton, Dudley J. Cowden, and Sidney Klein, Applied General Statistics (New York: Prentice-Hall, Inc. 1967) p. 414.

the existence of an important factor, other factors were used as an indirect measure of their existence.

The period of time covered by this study was reduced greatly because of the lack or inconsistency of available data. Sources of available data, United Nations Publications, World Handbook of Political and Social Indicators, showed that the period 1957-1964 allowed the most comparison between countries. Because of the availability of data, the period 1957-1964 was chosen as the time period to be covered by the study.

Where data were not available for all countries or were too far removed from the period under study, the countries for which statistics were available were considered representative of the whole region.

CHAPTER II

REVIEW OF LITERATURE

Development theories have attempted to explain the importance of various factors in economic development. Because the empirical study that follows makes use of these theories, it becomes important to briefly review them.

In order to set the stage for the theories to be reviewed, Rostow's stage will be discussed. The discussion of Rostow's theory will act as a summary of characteristics of underdeveloped nations during the phases of development.

From the discussion of stage theory, factors which pertain to the study that follows will be explored in greater depth.

Rostow's Stage Theory[4]

Rostow believed that a society passed through five stages of development:

1. Traditional Stage.
2. Pre-conditions for Take Off Stage.
3. Take Off Stage.
4. Drive to Maturity Stage.
5. High Mass Consumption Stage.

The traditional stage in Rostow's stage theory was characterized by:

1. Limited Technology in the Productive Process.
2. 75% of the Labor Force Involved in Agriculture.
3. High Proportion of Income Spent on Low Productive or Non Productive Outlays.

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[4] W. W. Rostow, "Take-off into Self-sustained Growth", in Studies in Economic Development, ed. by Bernard Okun and Richard W. Richardson (New York: Holt Rinehart and Winston, 1961) pp. 183-198.

4. Social Values Geared to Limited Horizons.

5. Social Structures Tending Toward Hierarchy.

6. Political Power Vested in Religious Leaders and Land Owners.

Rostow's preconditions for take off stage were characterized by:

1. A Build up of Social Overhead Capital.

2. A Technological Revolution in Agriculture.

3. An Expansion of Imports Financed by more Efficient Methods of Production.

In addition to these economic changes, several non economic changes occurred. Government, during this stage, provided a peaceful atmosphere conducive to modernization. Industrial entrepreneurs, with the freedom to operate, began to increase in number. The changes that took place during the precondition stage laid the basic foundation for the take off stage which followed.

Rostow characterized the take off stage as the stage of development where the annual rate of investment climbed to ten percent, where several of the sectors, using modern techniques, grew rapidly, and where groups desiring modernization overcame opposition of groups desiring to keep to traditional ways.

During the drive to maturity, Rostow's fourth stage, modern technology was applied to the bulk of the country's resources and new leading sectors took over as stimulants of growth as old sectors slowed down.

The age of high mass consumption, Rostow's last stage, found the society no longer faced with the task of applying modern technology to production. During this stage, the economy had three directions in which to apply its increased income:

1. Raise Private Consumption.

2. Provide more Security and Welfare Services to its Less Fortunate.

3. Seek Enlarged Power as a Nation on the World Scene.

The discussion of Rostow's stage theory indicated certain characteristics of underdeveloped countries. Of these characteristics, population and social overhead capital will be discussed in greater depth to provide a background to the study that follows.

Population Trap

The population trap theory is based on the assumption that surges in population growth that follows increases in per capita income inhibit economic development. As per capita income falls (due to rapid surges in population growth), the marginal propensity to consume increases, reducing saving and thereby, reducing further increases in per capita GNP.

The population trap is illustrated in Graph I. In Graph I the curve pp indicates the relationship between population growth and the level of per capita GNP. At low levels of per capita income, health conditions and nutritional levels are such as to cause the death rate to exceed the birth rate. As per capita income rises, the death rate falls below the birth rate causing a sharp rise in population. As the graph indicates, only at extremely high per capita income will the birth rate begin to fall.[5]

The curve yy shows the relationship between the savings ratio, capital output ratio, and the growth rate of national income. Since the savings ratio is a function of the income level, the curve rises from a zero growth rate to some maximum growth rate.[6]

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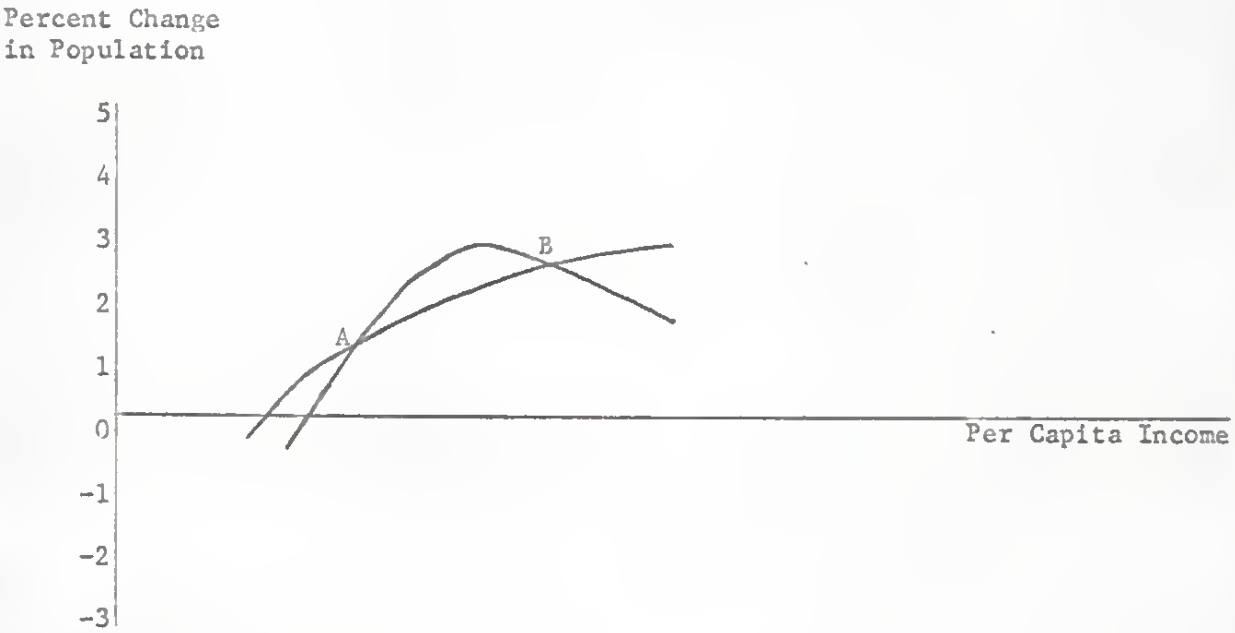
[5]Robert E. Baldwin, Economic Development and Growth, (New York: John Wiley & Sons, Inc., 1966) p. 47.

[6]Ibid. p. 48.

Point A on the graph indicates the trap. Increases in per capita income less than the amount necessary to move the economy to Point B will result in an expansion of population which will drive per capita income back to its original level at Point A. At Point B further increases in per capita income will not be counteracted by population increases. The rise in population that follows increases in per capita income indicates that a country must call forth some "minimum critical effort" to achieve sustained growth.

Though no country today seems to be in the low level equilibrium part of the population trap (Point A on Graph I), the population trap theory does point out the depressing effects population growth has on economic progress.[7]

Graph I--Low Level Equilibrium Population Trap



Investment in Human Capital

Education has replaced capital, in the thinking of some economists, as the key factor in economic development. Development planners are becoming increasingly concerned over the barriers that lack of skills and education present to

[7] Ibid. p. 49.

development.[8]

Research indicates that productivity in developed countries had been increasing faster than the inputs of physical capital and in addition to the labor force. Schultz, one of the leaders in stressing the economic importance of education, estimated that 1/5 of the growth in the United States output over the period 1930-1957 could be attributed to improvements in the human factor.[9] Dennison writing on the importance of education, estimated that 31% of the increased output in the United States could be explained by education.[10]

Because of the importance of education in promoting conditions which aid development, the selection of the proper educational program has become increasingly important. Enke believed that elementary education on a general level was most important in promoting national unity and communication.[11] A high degree of literacy was also deemed important to opening minds to new ideas and instilling a desire for further knowledge.

Lewis, on the other hand, viewed extensive primary education as a source of frustration to those who saw their relative position decline as others gained an equal educational background. Lewis believed that people with a secondary education were the biggest need of underdeveloped nations. Secondary education, Lewis believed, supplied the people, who with two to three years more training would become the secretaries, nurses, professional people, and school teachers.[12]

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[8]Baldwin, Economic Development and Growth, p. 95.

[9]Bruce R. Morris, Economic Growth and Development, (New York: Pitman Publishing Corporation, 1967) p. 184.

[10]Simon Kuznets, Modern Economic Growth: Rate, Structure, and Spread, (New Haven: Yale University Press, 196[illegible] pp. 81-82.

[11]Morris, Economic Growth and Development, pp. 184-185.

[12]Lewis, "Education and Economic Development," 10 Social and Economic Studies 116.

In addition to educational investment, investments to promote the health of individuals have also become more important. By limiting the causes of poor health, a nation increased the work capacity of its people to work. Improved health programs also brought longer lives and less exposure to diseases lessening the incidence of pain and suffering in the society.[13]

Lewis Model-Development with Unlimited Supplies of Labor[14]

The Lewis model explained a method of developing an economy which had an abundant population. Lewis, in his model, assumed that there was a limited amount of capital and an unlimited supply of labor. Lewis also assumed that there were two sectors in the economy, the capitalist sector and the subsistence sector. The capitalist sector was defined as that sector which used reproductible capital. The subsistence sector, on the other hand, was defined as that part of the economy which did not use reproductible capital. In the capital sector it was assumed that capitalists were profit maximizers and would only hire labor to the point where the marginal product of labor was equal to the wage. The floor to wages in the capital sector were in turn set by the wages people could get in the subsistence sector. The amount of employment of labor in the capital sector would be M (Graph II), where the marginal product of labor in the capital sector equaled the average product of labor in the subsistence sector. In order to induce laborers to move from the subsistence sector, Lewis stated that a bonus of 30% may have to be paid. The amount of employment would be Point M' (Graph III), where the marginal physical product

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[13]Morris, Economic Growth and Development, p. 189.

[14]W. Arthur Lewis, "Economic Development with Unlimited Supplies of Labor", in The Economics of Underdevelopment, ed. by A. N. Agarwala and S. P. Singh (New York: Oxford University Press, 1963) pp. 401-415.

of labor in the capital sector would equal the average physical product plus 30% in the subsistence sector (Graph III).

The area W'N,Q, (Graph IV) indicated a surplus to the capital sector. This surplus was the result of paying labor its average product while receiving labors marginal product. The key to development in the Lewis model was how the capital surplus was used. If the surplus were invested in more capital in the capital sector, the capital sector could hire additional labor until the marginal physical product of labor in the capitalist sector equaled the average product plus 30% in the subsistence sector. The now larger capital sector would receive a surplus of $W'N_2Q_2$. The surplus, if reinvested in the sector, would allow the capital sector to hire additional labor. This process would continue, in the Lewis model, until the marginal product of labor equaled the average product of labor in the subsistence sector. From this point on, the capital sector would have to compete with the subsistence sector for labor by paying a wage equal to the marginal product of labor in the subsistence sector.

Industrialization, in the Lewis model, was therefore, a process of worker exploitation to build up capital stocks in the capital sector.

Social Overhead Capital

The argument for investment in social overhead capital is quite dependent on the external effects these investments have on further investments. The benefits derived from investments in social overhead capital are low compared to their costs.

Social overhead capital is usually characterized by a long gestation period, large minimum size, long life and low variable costs.[15] Because of the

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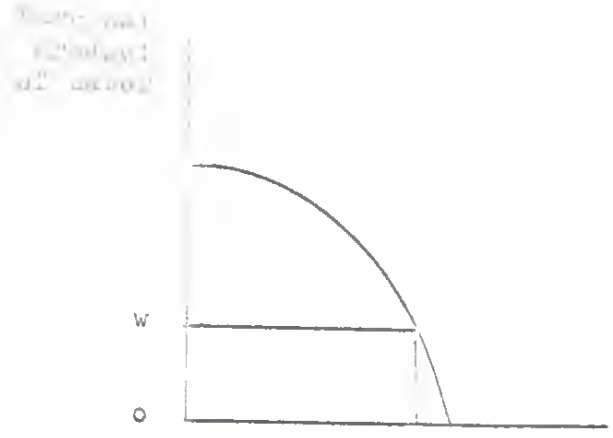
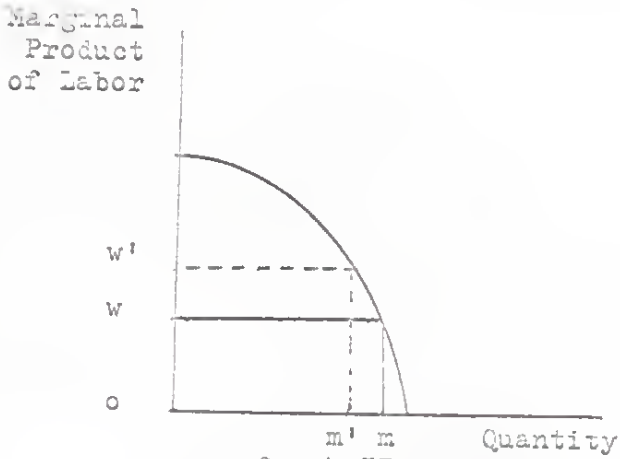
[15]Paul N. Rosenstein-Rodan, "The Theory of the Big Push" in Leading Issues in Development Economics, ed. by Gerald M. Mier (New York: Oxford University Press, 1964) pp. 434-435.



Graph I.--Employment in the Capital Sector



Graph II.--Employment in the Capital Sector with Gap

Graph III.--Expansion of Capital Sector

nature of social overhead capital, these projects, at least in the initial stages, may have a greater capacity than needed by the economy in the process of development.

However, social overhead capital projects cannot be judged on their return alone. These projects produce great external effects which may make other investments profitable. If this were the case, which it is, social overhead capital would form a basis for further more quickly yielding investment and are therefore important in long run development plans.

CHAPTER III

RECENT EMPIRICAL STUDIES

Some significant studies done by Professors Harbison, Myers, Adelman, and Morris have attempted to test empirically the existence of certain factors and per capita GNP levels. The Harbison and Myers study focused its attention on human resource development. The Adelman and Morris study focused its attention on sociological and political factors that may influence economic development. A review of the results of these studies may be quite useful in determining factors that the authors felt were related to levels of GNP and how differences in levels of GNP may be explained by these factors.

Objective of the Harbison and Myers Study

The objective of the Harbison and Myers study was to determine if a simple correlation existed between human resource development and per capita GNP. The variables chosen as indicators of human resource development were:

1. Number of Teachers (first and second level) per 10,000 population.
2. Physicians and Dentists per 10,000 population.
3. Engineers and Scientists per 10,000 population.
4. Pupils enrolled at first-level (Primary) education as a percentage of estimated population age 5-14.
5. The adjusted school enrollment ratios for first and second levels combined.
6. Pupils enrolled at second level (Secondary) education as a percentage of the estimated population 15 to 19 inclusive, adjusted for the length of schooling.

7. Enrollment in third level (Higher) education as a percentage of the age group 20 to 24.
8. Percentage of students enrolled in scientific and technical facilities in a recent year.
9. The percentage of students enrolled in facilities of humanities, fine arts, and law in the same year.

The first three indicators (1 through 3) chosen were used as measures of the stock of high level manpower. The next four indicators (4 through 7) chosen were used as a measure of potential increase in high level manpower. The last two indicators (8 and 9) chosen were used to determine the direction or orientation of higher education.

The Composite Index

After experimenting with several of the indicators of human resource development, Harbison and Myers developed a fairly simple composite index by which they could rank the 75 countries in their study. The composite index was an arithmetic total of enrollment in secondary education (adjusted for different time lengths of secondary education in different countries) as a percentage of the population 15 to 19 and third level enrollment as a percentage of its age group multiplied by a weight of five.[16] The weight was placed on third level education because the authors felt that third level education indicated a greater level of human resource development than did the secondary level.

Once the countries had been ranked by their composite index, the countries

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[16]Frederick Harbison and Charles A. Myers, Education Manpower and Economic Growth: Strategies of Human Resource Development, (New York: McGraw-Hill Book Company, 1964) p. 32.

were divided into four levels of human resource development.[17] The lowest level was I and the highest level was IV. The characteristics of countries in each level were compared.

Table One shows the final result of the comparison between the four levels of human resource development and economic development. The table indicates that countries in the lower levels of human resource development have lower per capita incomes, have a higher percentage of their population in agriculture, have a lower school enrollment as a percentage of population of school age, have their higher education oriented toward the humanities and have a large percentage of their population in the younger age groups.

Correlation coefficients were computed for each of the indicators in Table One. Table Two shows the correlation coefficient matrix of the indicators for the group of 75 countries.

As the table indicates, there was a very high positive correlation between the composite index ranking of countries and per capita GNP ranking (.888). Also indicated by the table was a very high negative correlation between the composite index and percent active population in agriculture (-.814). The table also indicates that the second level ratio (percentage of population ages 15 to 19 enrolled in second level schools) correlated quite highly with per capita gross national product. In addition, the table indicates a high correlation between the stock indicators of high level manpower (teachers, scientists, physicians per 10,000 population) and the level of per capita GNP.

Two indicators also correlated quite highly with public expenditure on education, the third level enrollment ratio and the percent of population in the age group 5 to 14 (.734 and -.720 respectively). These correlations

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[17] Ibid.

TABLE 1.--Indicators of Human Resource and Economic Development: Arithmetic Means by Levels of Human Resource Development[18] (rounded to nearest digit)

Indicator	Level I 17 countries	Level II 21 countries	Level III 21 countries	Level IV 16 countries
Composite index (second and higher education) ...	3	21	50	115
GNP per capita, U.S. dollars.....	$84	$182	$380	$1,100
Per cent active population in agriculture	83	65	52	23
Teachers (first and second levels) per 10,000 population	17	38	53	80
Scientists and engineers per 10,000 population	0.6	3	25	42
Physicians and dentists per 10,000 population	0.5	3	8	15
First-level enrollment ratio (unadjusted)	22	42	62	73
First- and second-level enrollment (adjusted)	20	45	68	89
Second-level enrollment ratio (adjusted)	2.7	12	27	59
Third-level enrollment ratio (unadjusted)	0.15	1.6	5	11
Per cent enrolled in scientific and technical faculties	24	28	26	28
Per cent enrolled in humanities, fine arts, and law faculties.....	34	39	33	32
Public expenditures on education as per cent of national income.....	3.7	2.1	3.1	4.2
Per cent in age group 5-14 inclusive.	24	24	22	18

[18]Taken from: Harbison and Myers, Education, Manpower and Economic Growth: Strategies of Human Resource Development, p. 38.

TABLE 2.—Coefficient Matrix of Results: Harbison and Myers Study[19]

Indicators	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Composite index		.888	−.814	.770	.579	.491	.656	.810	.905	.620	.079	−.160		
2. GNP per capita, U.S. dollars	.888		−.818	.755	.833	.700	.668	.732	.817	.735	.021	−.017		
3. Per cent active population in agriculture	−.814	−.818		−.797	−.806	−.826	−.775	−.816	−.835	−.675	−.015	−.073		
4. Teachers per 10,000 population	.770	.755	−.797		.373	.339	.739	.870	.671	.392	.069	−.071		
5. Engineers and scientists per 10,000 population	.579	.833	−.806	.373		.816	.103	.895	.791	.781	−.303			
6. Physicians and dentists per 10,000 population	.492	.700	−.827	.339	.816		.205	.759	.656	.832	−.210	.098		
7. First-level enrollment ratio	.656	.668	−.775	.739	.103	.205		.966	.485	.155	.205			
8. First- and second-level ratio	.810	.732	−.816	.870	.895	.759	.966		.804	.744	.196			
9. Second-level ratio	.905	.817	−.835	.671	.791	.656	.485	.804		.758	−.005			
10. Third level ratio	.620	.735	−.675	.392	.781	.832	.155	.744	.758		−.246			
11. Per cent in science and technical faculties	.079	.021	−.015	.069	−.303	−.210	.297	.196	.005	−.246		−.281		
12. Per cent in humanities, arts, law	−.160	−.017	−.073	−.071	.013	.098	−.126	−.169	−.120	−.131	−.234			
13. Public expenditure on education (per cent national income)	.038	.101	−.201	.142	.462	.722	−.401	.378	.376	.731	−.498	−.215		
14. Per cent in age group 5-14	−.522	−.515	.595	−.310	−.612	−.660	−.210	−.561	−.670	−.751	.129	.180		

[19] Harbison and Myers, Education, Manpower and Economic Growth: Strategies of Human Resource Development, p. 39.

indicated that higher education was more costly and countries that had a large percentage of their population in the younger age groups were the countries least able to increase the portion of their national income devoted to education.

The conclusions of the study were:

1. There was a high correlation between per capita GNP and human resource development.
2. There was a high correlation between the composite index and indicators which measure economic development.

The results of the study, however, did not permit a conclusion that an increase in second level education would necessarily result in a certain amount of growth of national income.

Objective of the Adelman-Morris Study

The objective of the Adelman and Morris study was to gain some semi-quantitative insights into the inter actions of various types of social and political factors and the level of economic development.

In their study, Adelman and Morris used factor analysis to determine the extent differences of social and political institutions had on explaining different levels of economic development.[20]

The social and political variables chosen for their study were:

1. Per Capita GNP.
2. Size of the Traditional Agricultural Sector.
3. Basic Character of Social Organization.

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[20]Irma Adelman and Cynthia Taft Morris, "A Factor Analysis of the Interrelationship Between Social and Political Variable and Per Capita GNP." (Unpublished Paper, Office of Program Coordination of the Agency for International Development.) p. 15.

4. Extent of Literacy.
5. Extent of Mass Communication.
6. Degree of Cultural and Ethnic Homogeneity.
7. Significance of Indigenous Middle Class.
8. Degree of Modernization of Outlook.
9. Extent of Social Mobility.
10. Effectiveness of Democratic Institutions.
11. Degree of Freedom of Political Opposition and Press.
12. Degree of Factionalization of Political Parties.
13. Basis of Political Party System.
14. Strength of Labor Movement.
15. Political Strength of Military.
16. Degree of Administrative Efficiency.
17. Degree of Centralization of Political Power.
18. Strength of Traditional Elite.
19. Extent of Nationalism.
20. Degree of Commitment of Leadership to Economic Development.
21. Extent of Government Participation in Economic Activity.
22. Degree of Social Tension.
23. Extent of Stability of Political System.

The Results of Study

FACTOR I - Changes in Institutions Accompanying Urbanization and Industrialization

The first row of Table Three indicates the amount of variation in per capita GNP $(.64)^2$ explained by Factor I. Factor I expressed the inter action between economic development and the degree of rationalization of social behavior, values and institutions.

TABLE 3.--Rotated Factor Matrix for Per Capita GNP Together with 22 Social and Political Variables[21]
(74 Less-Developed Countries)

	Political and Social Indicators	Rotated Factor Loadings				h_i^2
		F_1	F_2	F_3	F_4	(R^2)
1.	GNP Per Capita	.64	.43	-.22	.12	.661
2.	Size of Traditional Agrieultural Sector	[-.83]	-.32	.21	.03	.832
3.	Character of Basie Social Organization	[.86]	.26	-.05	-.04	.819
4.	Extent of Literacy	[.83]	.37	-.08	.09	.840
5.	Extent of Mass Communication	[.85]	.34	-.08	.04	.843
6.	Degree of Cultural and Ethnic Homogencity	[.72]	-.30	.07	.17	.645
7.	Significance of Indigenous Middle Class	[.63]	.31	-.40	.05	.659
8.	Degrcc of Modernization of Outlook	[.64]	.46	-.33	.13	.753
9.	Effectivcness of Demoeratic Institutions	.36	[.79]	-.17	.19	.835
10.	Freedom of Politieal Opposition and Prcss	.27	[.86]	.04	.08	.830
11.	Degree of Factionalization of Political Parties	.33	[.78]	.07	-.30	.810
12.	Basis of Political Party System	.42	[.68]	-.06	-.11	.659
13.	Strength of Labor Movement	.29	[.71]	-.34	.08	.715
14.	Political Strength of the Military	.38	[-.58]	.29	-.36	.699
15.	Degrce of Administrativc Efficiency	.30	[.53]	-.48	.20	.638
16.	Degrec of Centralization of Political Power	-.23	[-.76]	.20	-.07	.617
17.	Extent of Social Mobility	.42	.14	[-.55]	.24	.549
18.	Strength of Traditional Elitc	.03	-.15	[.82]	-.04	.700
19.	Extent of Nationalism and Sense of National Unity	.61	-.05	[-.57]**	-.01	.694
20.	Extent of Leadership Commitment to Development	.11	.21	[-.75]	.29	.696
21.	Extent of Government Participation in Eeonomic Activity	.27	-.41	[-.48]	-.41	.638
22.	Degree of Soeial Tension	-.23	.03	.08	[-.84]	.771
23.	Extent of Stability of Political System	.04	.08	-.24	[.86]	.804

* Boxes indicate the factor to which each variablc has been assigned.

** Sinee the loadings for the indicator of extent of nationalism are not signifieantly different in Faetors I and III, this variable is assigned to that faetor to which it is judged to have the elosest affinity.

[21]Taken from: Adleman and Morris, "A Factor Analysis of the Interrelationship..., p. 16.

The indicators which had the highest loadings in this factor were:

1. Size of the Traditional Agricultural Sector.
2. Character of Basic Social Organization.
3. Extent of Literacy.
4. Extent of Mass Communication.
5. Degree of Cultural and Ethnic Homogeneity.
6. Significance of Indigenous Middle Class.
7. Degree of Modernization of Outlook.

The negative sign on the size of the tradition sector was expected. Countries which had a large traditional agricultural sector would employ a technology which would yield a lower product and thereby a lower national income.

The positive sign of the extent of literacy showed the positive relationship between education and income levels. The positive value of extent of communication indicated that an increase in the level of communication was associated with increased urbanization. The positive loading on the degree of cultural and ethnic homogeneity also reflected the impact of urbanization and industrialization on communication among members of the society. The high positive loading of the strength of the indigenous middle class showed the role this class performed in furthering the process of industrialization. The degree of modernization of outlook indicated that countries which supported views that favored modernization, socially, economically, and politically, experienced higher levels of income.

FACTOR II - Strength of the Political System

Factor II which explained 18.5% of the variation $(.43)^2$ between per capita GNP levels dealt with the broad historical and political differences between Western Europe, the North Atlantic, and the rest of the world.

The indicators with highest factor loadings in this factor were:

1. The Strength of Democratic Institutions.
2. The Freedom of Political Opposition.
3. The Degree of Factionalism of Political Parties.
4. The Strength of the Labor Movement.
5. The Basis of Political Party System.
6. The Political Strength of the Military.
7. The Degree of Centralization of Political Power.

The positive loadings of the indicators in this factor indicated a move from centralized political forms to Western-type parliamentary systems. The negative signs on the political strength of the military and degree of centralization of political power indicated a move to a more broad base political system.

The high coefficients of the indicators in this factor indicated a higher income level associated with a movement toward a western type political system, a well established labor movement, and a greater decentralization of political power.

It was interpreted that change in basic attitudes that allowed the change of political organizations and institutions also tended to generate receptivity to technical change, and approval of enterprise and initiative crucial to increasing the capacity necessary for sustained economic growth of the economy.

FACTOR III - Character and Nature of Leadership

The amount of inter country variation in per capita GNP attributable to this factor was 5%. The indicators which had their highest loadings in this factor were:

1. Strength of Traditional Elite.
2. Extent of Nationalism.

3. Degree of Leadership Commitment to Development.

4. The Extent of Social Mobility.

The signs of these factor loadings indicated that countries characterized by nationalistic industrialized leadership and weakening power of the traditional elite had higher income levels.

FACTOR IV - Stability of Social and Political Environment

The effect of this factor on variation in per capita GNP amounted to only 1.4%, $(.12)^2$. The indicators which had the high loadings in the factor were:

1. Degree of Social Tension.

2. Extent of Stability of Political Systems.

The high loadings of these indicators reflected the need for political stability and the lack of serious social tension to achieve sustained economic growth.

The small impact of this factor was the result of defining degrees of political stability over a short period of time and the breakdown of traditional structures with its effect on uncertainity and economic growth.

The study was then broken down into three regions as a check on the accuracy of the total result. The regions were: Africa, Near and Far East, and Latin America.

Table Four showed the effect the different factors had on explaining variation in per capita GNP in the different regions.

The difference of roles played by each factor was explained by the different levels of development among the regions.

Factor I, for example, was higher in the African region due to the large number of African countries characterized by the dominance of preliterate communities.

TABLE 4.--Summary of Regional Results

Region	Factors			
	F_1	F_2	F_3	F_4
Full Sample	.64	.43	-.22	.12
Africa	.88	.04	.02	.13
Near and Far East	.72	.47	-.14	-.03
Latin America	.62	.46	-.32	-.13

Adelman and Morris concluded from the high loading of Factor I that most African nations were still in a pre-take off stage where social structures created barriers to economic growth.

The relative low effect of Factors II, III, and IV was explained by the little change of social institutions required to westernize political forms.

The higher value of Factor IV, in the region, indicated that countries which experienced the greatest erosion of the traditional social structure had a higher income level.

In the Near and Far East region, Factor I once again was the dominant factor in explaining the difference in development level. However, in the Near and Far Eastern region, Factor II plays a more important role than in the African region. This increased role attributed to Factor II (political westernization) indicated that development was far less hindered by traditional social structure than in Africa.

Factors III and IV played a very small role in explaining differences in the development level of the Near and Far Eastern countries.

In the Latin American region, the social structural barriers (Factor I) explained less of the difference in economic development. Factor II, influences on political westernization, assumed a greater role in this region.

Factor III was changed to represent the amount of sophistication of the political systems.

The high positive association with Factor II indicated a close relationship between urbanization and the increased voice of the political system.

The conclusions of the study were:

1. The integration of social units was important in explaining the differences in level of per capita GNP.
2. The degree of articulation and westernization of political institutions played a key role in explaining inter country variation in per capita income.
3. The character of leadership and political stability play a very small role in explaining differences in per capita GNP levels over the last decade.

The results of the Harbison-Myers study and the Adelman-Morris study gave some indication of the change that took place in a society with increases in income. The authors in both studies stated that the changes that did take place were not necessarily the causes of growth but may be the result of growth.

However, their studies do point out some interesting aspects to development. First, economic factors alone may not determine economic growth. The Adelman-Morris study indicated that at different levels of GNP, institutional barriers played varying roles in explaining differences in per capita GNP. Second, (this conclusion is my own) countries may actually pass through different stages of economic, social and political growth. The stages need not

have rigid boundaries such as they have in Rostow's stage theory mentioned earlier. Instead, the stages may be loose approximations of effects different factors have at different levels of development.

CHAPTER IV

RESULTS OF EMPIRICAL STUDY

The objectives of the study were to determine whether certain factors could be associated with different levels of gross national product.

The factors * chosen were:

1. Literacy Rate.
2. Primary and Secondary Education as Percent of the Total Age Group (5-19).
3. Percent of Labor Force in Agriculture.
4. Percent of Population Living in Rural Areas.
5. Number of Persons Per Physician.
6. Agriculture as a Percent of 1963 GNP.
7. Birth Rate.
8. Miles of Improved Roads Per 1,000 Square Miles.
9. Rail Per 1,000 Square Miles.
10. Export + Import as Percent of 1963 GNP.
11. Mining as Percent of 1963 GNP.
12. Manufacturing as Percent of 1963 GNP.
13. Construction as Percent of 1963 GNP.
14. Services as Percent of 1963 GNP.
15. Power Per Capita.

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*In addition to the factors listed above, other factors were chosen. The additional factors and their correlation coefficients are indicated in Appendix Three. The 15 factors selected for further explanation were those which correlated more highly with per capita gross national product for the regions as a whole.

Countries (where information was available) were ranked for each of the 19 characteristics. The ranking in each of the characteristics was from lowest amount of the characteristic to the highest amount.

After the ranking was completed, the characteristics were compared with 1964 per capita gross national product which was ranked in a similar manner.

The results of the comparison between GNP and the factors chosen are indicated in Table 5.

Table 5 indicates that several factors correlated quite highly with per capita gross national product. These factors were:

1. Literacy.
2. Primary and Secondary Education.
3. Percent of Labor Force in Agriculture.
4. Percent of Population Living in Rural Areas.
5. Number of Persons Per Physician.
6. Agriculture as Percent of 1963 GNP.
7. Birth Rate.
8. Rail Mileage Per 1,000 Square Miles.
9. Mining as a Percent of 1963 GNP.
10. Manufacturing as a Percent of 1963 GNP.
11. Services as Percent of 1963 GNP.

Interpretation of the Results

To facilitate the discussion of the results, the characteristics were grouped into sections. The sections of discussion were population, social overhead capital, and sources of per capita GNP.

The factors in each section were:

A. Population.

1. Literacy.

TABLE 5.--Correlations between Characteristics and Per Capita Gross National Product 1964

REGION	Literacy Rate	Primary and Secondary	% of Labor Force Agric.	Power Per Capita	No. of People Per Physician	Birth	% of 1963 GNP Agric.
Total	.612	.620	-.624	.751	-.747	-.464	-.771
South America	.784	.635	-.641	.757	-.646	-.608	-.613
Africa	.202	.550	-.862	.661	-.660	-.571	-.667
Middle East	.465	.715	-.023	.436	.400	-.604	-.300
Far East	.673	.834	-.316	.519	-.167	-.477	-.768

REGION	Miles Improved Roads	Railway per 1000 sq. Miles	% of 1963 GNP Mining	% of 1963 GNP Manufacturing	% of 1963 GNP Construction	% of 1963 GNP Service
Total	.238	.592	.428	.568	-.074	.597
South America	.348	.397	.114	.306	.397	.643
Africa	.628	.575	.394	.485	.291	-.300
Middle East	.572	-.142				
Far East	.478	.382	.267	.262	.093	.230

2. Primary and Secondary Education as a Percentage of Population Ages 5-19.
3. Number of Persons Per Physician.
4. Birth Rate.

B. Social Overhead Capital.

1. Power Per Capita.
2. Rail Mileage Per 1,000 Square Miles.
3. Road Mileage Per 1,000 Square Miles.

C. Sources of Per Capita GNP.

1. Agriculture.
2. Manufacturing.
3. Services.

Population

The discussion in Chapter II indicated the possible depressing effects which population increases may have on per capita GNP growth. However, when comparing average increases in population with changes in GNP, the results were not significant (correlations of -.048 for South America, -.187 for the Middle and Far East, and .146 for Africa).* These results would help substantiate the comment made in Chapter II that, at least in a regional sense, the low level equilibrium population trap is not an overriding problem in today's developing nations.

In addition to the quantity aspects of population, several quality aspects were considered. The .612 correlation of literacy rate with per capita gross

*Significant correlation in this study are those correlations at the 5% region of rejection.

national product indicated a general tendency for literacy to rise with GNP. This fact is further substantiated by the correlation coefficient associating literacy and GNP in the four separate regions.

The South American region which had the highest average income ($321) of the regions studied had a very high correlation (.784) between literacy and per capita GNP. In the Far Eastern region, though it ranked fourth as far as average income was concerned ($117), had a high correlation between literacy and per capita GNP (.673). The high correlation between literacy and per capita GNP and the yet low average per capita income for the region may be partially explained by the countries in the region. India, Pakistan, Philippines, and South Korea or approximately 36% of the countries in the region were associated in one way or another with developed nations which stressed universal education. It is possible the stress on universal education may have been transmitted to these countries. This contention is partially substantiated by results of the Harbison and Myers study. India, Pakistan, and South Korea tended to rank higher in human resource development than warranted by their per capita GNP.[22]

The lower correlations between per capita GNP and literacy in the Middle Eastern and African regions where average per capita income for the region was higher than that for the Far Eastern region (259 and 140 respectively) may be partially explained by the role of natural resources in these regions. The higher correlation of per capita GNP and mining as a percent of 1963 GNP implied that natural resources, at least in the African region, may have played a more important role in this region.

Primary and secondary education enrollment as a percent of population

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[22]Harbison and Myers, Education Manpower and Economic Growth: Strategies of Human Resource Development, p. 33.

Ages 5-19, an indicator of future growth in literacy, was also highly correlated with per capita GNP. This would tend to indicate that countries at higher levels of per capita GNP could afford to have a higher proportion of their young in school rather than working. The high correlation would also tend to indicate that a high literacy rate may be the result rather than the cause of rises in income. The statistical evidence presented here does not indicate the direction of the causal relationship that might exist between literacy and level of gross national product. However, as Enke pointed out in Chapter II above, education may play an important role in opening minds to acceptance of new ideas that may promote development.

Another indicator of quality of human resources, number of people per physician, was significantly inversely related to per capita GNP (-.747). This indicated that countries with lower incomes had fewer physicians per person. The correlation between this characteristic and each region was consistently inversely related - South America -.641, Middle East -.357, Africa -.507 and Far East -.629. This lack of physicians in lesser developed countries may possibly be attributable in part to the desire of educated people (doctors) to move to areas where they can receive the most benefit from their knowledge and training. Consequently, these individuals tend to migrate out of underdeveloped areas.

Though the number of physicians per person is quite low, the death rate is not exceptionally high. In initial work done in the study, it was found that a small negative correlation existed between the death rate and the level of per capita GNP.* The small negative correlation may, due to international health

*See Appendix Three.

programs, no longer be an indicator of underdevelopment. The birth rate, on the other hand, had a higher negative correlation (South America -.608, Africa -.571, Far East -.478, and Middle East -.588). The higher negative correlation between the birth rate and the level of per capita gross national product indicated that health programs didn't have the impact on the birth rate as they did on the death rate. The difference in effect may partially be explained by the role traditions play in determining the birth rate. In underdeveloped countries a large family may be a means of increasing income or insuring old age care.

Up to this point, various characteristics have been compared with the level of per capita gross national product. In order to determine whether any relationship existed between chosen characteristics, an intercorrelation was run. The results of this intercomparison are indicated in Table 6.

The table indicates that the literacy rate, the factor of concern in this section, correlated quite highly with manufacturing as percent of 1963 GNP (.606). However, in the regions where information was available, only one region showed a significant correlation between the literacy rate and manufacturing. The low correlation (.175) between literacy rate and manufacturing in the Far Eastern region implied that the conclusion reached earlier on western influences on universal education in this region may be correct. The low correlation (.108) between manufacturing and literacy rate in the African region can possibly be explained by the traditional stage of development existing in a large number of the countries in the region. As Adelman and Morris pointed out in their study, the African countries are more or less in the precondition stages of development where institutions explain a great amount of the difference in per capita GNP levels. If this were the case, manufacturing

TABLE 6.--Correlations of Intercomparison of Characteristics

REGION	Power with mgf.	Literacy with mgf.	Railway with mgf.	Mgf. with Const.	Services with mgf.	X+M with mgf.	Literacy with % pop. Rural	Power with Mining	Agric. with X+M	Mining with X+M
Total	.634	.606	.531	-.018	.573	-.350	-.533	.401	-.112	.154
South America	.568	.602	.361	.088	-.283	-.650	-.764	.280	.150	.140
Africa	.893	.108	.946	.215	.853	.772	-.437	.867	-.714	.315
Middle East									-.300	
Far East	.302	.175	-.365	-.473	.679	-.333	-.823	.834	-.183	-.116

which correlated the highest with GNP in the African region (Table 5) would not necessarily be accompanied by increases in literacy rate as would normally occur in regions where institutional barriers were less restrictive. The effects of manufacturing on literacy would be held to small pockets in an otherwise primitive world.

Social Overhead Capital

Social overhead capital, as discussed in Chapter II provided a basis for faster, more directly yielding investments.

The results of the study tended to verify this belief. The power per capita figures correlated significantly with per capita GNP (.751)*. When comparing power per capita and manufacturing, the correlation was once again significant (.634)**. The significant correlation between manufacturing and power implied that as industrialization progressed so did the need for power.

This implication tended to be true in each of the regions which had a higher correlation GNP to manufacturing. Although none of the regions showed significant when comparing GNP to manufacturing, those regions which had a higher correlation in this comparison (Africa .485, Latin America .306)* had a higher correlation than the other regions when comparing power per capita to manufacturing (Africa .893, South America .568)**. The exceptionally high correlation between power per capita and manufacturing in the African region may be partially explained by the relative backwardness of the countries in the region. Because the people of these countries have low incomes, electricity could be considered a luxury item, suggesting that the power which is produced is used primarily by manufacturing plants.

Investments in transportation facilities, unlike those in power, did not

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*Table 5

**TAble 6

correlate quite so highly with per capita GNP. The correlation between improved roads and per capita GNP was not significant for the regions as a whole (.238)*. The correlation was significant only in the African region (.925)*. When comparing improved roads with manufacturing, the correlations were not significant in any region. However, when comparing rail mileage per 1,000 square miles, the correlation for the regions as a whole was significant (.902)*. Although railway mileage was significant for the total of all regions, it was only significant in the African region. When comparing rail mileage with manufacturing, the correlation for the regions as a whole, was similar to that between rail and per capita GNP (.531)**. However, the correlation between rail and manufacturing was extremely high (.946)** in the African region.

The low correlation between roads and per capita GNP can probably be partially explained by the existence of other forms of transportation such as water and rail.

The more significant correlation between rail and manufacturing would tend to add more validity to this contention. Manufacturing (which is associated with higher levels of per capita GNP) would rely more on means of transportation that weren't affected by varying weather conditions. The high correlation between rail and manufacturing in the African region would tend to imply that other forms of transportation are not readily usable, such as rivers, or unavailable, such as roads. Though the road mileage and per capita GNP correlation would tend to contradict this belief, definitions of improved roads may have some distorting effects. In one country for instance, an improved road

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*Table 5

**Table 6

may be nothing more than a gravel track which is only passable during the dry season.

The conclusions that can be drawn on the value of investment in roads and rail facilities seem not to be as clear as that on investment in power facilities. However, investment in rail facilities may be quite appropriate in long run development plans. Though roads do not seem to be particularly correlated with manufacturing, they may be of great benefit in unifying a society.

Sources of Gross National Product

The origin of gross national product may show the changes in the economic make up in an economy as economic development progresses.

Table 7 traces the pattern of change for a selected number of countries as they moved toward development. The table indicates that industry and services make up a larger share of National Income as economic development progresses.

The components of Gross National Products used in the study were not exactly comparable to those in Table 7. However, Table 8, which compares the regions in the study, tends to agree with Table 7 on developed nations. Table 8 shows a tendency for the more developed regions to average higher with respect to manufacturing and services than the lesser developed regions.

The significant correlations (.568)* between manufacturing and level of per capita gross national product implied that manufacturing was associated with higher levels of income. The significant negative relationship (-.771)* between agriculture also implied that low levels of income were associated with economies whose main component of gross national product was agriculture. The

*Table 5

TABLE 7.--Distribution of National Product Among Three Major Sectors, Selected Countries, Long Periods[22]

Country	Shares in National Product %					
	Agriculture		Industry		Services	
	Initial Date	Terminal Date	Initial Date	Terminal Date	Initial Date	Terminal Date
United Kingdom						
1. Great Britain National income 1801-1841	32	22	23	34	44	54
2. United Kingdom GNP 1924-1955	4	5	52	56	44	39
France						
1. National income 1789/1815-1825/35	50	50	20	25	39	25
2. National Income 1872/82-1908/10	42	35	30	37	28	28
3. Gross National Product 1954-1962	12	9	52	52	36	39
Germany						
1. 1913 Reich National Income 1860/69-1905/1914	32	17	33	40	51	53
2. Federal Gross Domestic Product 1950-1962	13	9	47	51	40	40
United States						
1. Commodity Product 1839-1879	69	49	31	51		
2. National Income 1929-1961/63	9	4	42	43	49	53

[22]Taken from: Simon Kuznets, Modern Economic Growth: Rate, Structure, and Spread, (New Haven: Yale University Press, 1966) pp. 88-90

significant correlation of services with gross national product could also indicate that services become a more important part of the economy as growth progresses.

TABLE 8.--Components of GNP
(Average Percent Per Nation)

Region	Agriculture	Manufacturing*	Services
South America	27.68	16.82	42.79
Africa	42.53	10.91	39.94
Middle East	17.09		44.57
Far East	31.45	9.43	42.54

*Sample for Manufacturing in Middle East was too Small to Yield any Reliable Results.

When comparing the percentage components of gross national product of the underdeveloped regions (Table 8) with the developed countries (Table 7), a rough comparison was obtained between the stages of development of today's underdeveloped regions and the historical changes that occurred in today's developed nations.

The agricultural component of gross national product of the South American region was roughly equal to that of Great Britain around the early 1800's. The manufacturing sector, on the other hand, was roughly equivalent to that of Great Britain before 1800.

When comparing the South American region with the development history of France, it was found that the agricultural sector was comparable to the agricultural sector of France just after 1910 while the manufacturing sector was comparable to that of France before 1789.

In comparing the other regions with respect to agriculture and manufacturing, it was found that the agricultural component of gross national product

was comparable to a much later date than was the manufacturing component.

A possible explanation of this difference in dates may be due to the definition of manufacturing (used in this study). Although this qualification may explain part of the difference, the implication is that the underdeveloped regions of today are lacking the industrialization the developed countries of today had during their early stages of development.

However, with respect to services, today's underdeveloped regions are not behind the developed nations. Comparison of Table 7 and Table 8 indicates the service sector of today's underdeveloped economies, as a percentage of total GNP, is roughly equal to the service sector, as a percent of total GNP, in today's developed nations.

CHAPTER V

SUMMARY AND CONCLUSIONS

As the studies in this paper have pointed out, the process of economic development is a multi-dimensional problem. The Adelman-Morris study pointed out the effects noneconomic factors had in explaining differences in per capita GNP levels. The Harbison-Myers study showed that a high level of human resource development correlated significantly with the level of per capita GNP. The empirical study in Chapter IV, above, pointed out the changing roles of various sectors in the economy as development progressed.

The result of Chapter IV, also indicated that quality changes in population are associated with higher levels of income. The study indicated that greater amounts of social overhead capital are associated with higher income levels.

From this discussion several conclusions can be drawn. First, investment in social overhead capital, especially power, are indeed important. It is these investments that act as a basis for the future projects that will promote growth. Second, institutions and institutional barriers do limit development. Traditions which limit the spread of modern technology in the agricultural sector will tie up valuable labor needed to promote development in other sectors. Third, the quality of the labor force must improve if that labor force is to fit into and become a useful part of a developing society. Fourth, it was concluded that the factors in the above discussion are associated with development, but need not be the causes of it. This conclusion can be illustrated by the countries in the South American region. Argentina, one of the

countries which have high literacy (91%), experienced a growth of per capita GNP of 9.5% over the period 1958 to 1960. Brazil, another country in the region with a considerably lower literacy rate (61%), experienced a rise of 18% in per capita GNP over the same period.

It must finally be concluded then, that it is the relationship between all factors, economic, sociological, and political that will determine the amount of influence one factor will have in the development process.

APPENDICES

APPENDIX I

COUNTRIES USED IN THE STUDY

South American Region

1. Argentina
2. Bolivia
3. Brazil
4. Chile
5. Colombia
6. Costa Rica
7. Ecuador
8. El Salvadore
9. Guatemala
10. Haiti
11. Honduras
12. Mexico
13. Nicaragua
14. Panama
15. Paraguay
16. Peru
17. Uruguay
18. Jamaica
19. Surinam
20. Dominican Republic

Middle Eastern Region

1. Cyprus
2. Iran
3. Iraq
4. Jordan
5. Syria
6. Egypt
7. Turkey

African Region

1. Algeria
2. Cameroon
3. Congo (Leopoldville)
4. Ethiopia
5. Ghana
6. Guinea
7. Kenya
8. Liberia
9. Morocco
10. Nigeria
11. Southern Rhodesia
12. Rwanda
13. South African Republic
14. Sudan
15. Tunisia
16. Uganda

Far Eastern Region

1. Ceylon
2. India
3. Pakistan
4. Burma
5. Cambodia
6. South Korea
7. Philippines
8. Thailand
9. South Vietnam
10. Afghanistan
11. China (Taiwan)

APPENDIX II

STATISTICAL DATA ON FACTORS USED IN THE STUDY BY COUNTRY

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South America

	a	b	c	a	a	d	b	f	f
	Money GNP 1957 $US	Money GNP 1964 $US	% of Population Rural	Average % Increase Population	Literacy Rate	Primary & Secondary Enrollment as % ages (5-19)	% of Labor Force in Agriculture	% of GNP Agriculture 1957	% of GNP Agriculture 1963
Argentina	490	523	32.0	1.7	91	57	25	17.5	16.9
Bolivia	99	99	77.0	2.3	32	30	72	33.1	31.5
Brazil	293	293	59.2	3.1	61	38	61	30.9	28.3
Chile	379	471	33.0	2.3	84	58	30	12.9	9.4
Colombia	263	306	66.0	2.9	62	37	55	36.3	32.9
Costa Rica	357	383	66.0	3.8	84	56	55	37.8	33.3
Ecuador	189	215	56.1	3.0	68	40	53	36.5	37.7
El Salvador	219	285	61.0	3.2	48	38	63	28.1	37.0
Guatemala	189	293	67.7	3.1	30	25	68	28.8	31.4
Haiti	105	73	87.0	2.1	10	21	83	48.7	48.6
Honduras	194	218	69.0	3.1	45	32	66	44.5	42.8
Mexico	262	454	50.0	3.2	71	42	58	20.3	18.0
Nicaragua	160	325	66.6	3.0	50	25	68	40.0	37.3
Panama	329	488	58.5	3.0	78	53	54	40.7	21.8
Paraguay	114	208	--	2.2	68	50	55	36.9	37.3
Peru	179	280	57.2	3.0	61	39	60	19.5	21.6
Uruguay	478	518	--	1.3	91	56	37	20.1	22.8
Jamaica	316	438	--	2.6	85	54	49	12.1	11.4
Surinam	142	340	--	4.0	80	64	65	--	--
Dominican Republic	239	246	76.2	3.5	64	49	56	--	--

South America (Continued)

	f	f	f	f				
	% of GNP Manufacturing 1957	% of GNP Manufacturing 1963	% of GNP Mining 1957	% of GNP Mining 1963	Change of Agriculture % of Total 1957-1963	Change of Manufacturing % of Total 1957-1963	Change of Mining % of Total 1957-1963	Power per Capita
Argentina	32	31.0	7.0	15.5	- 1.5	-1.0	8.5	663
Bolivia	11.1	12.6	18.1	13.0	- 1.6	1.5	-5.1	123
Brazil	--	--	--	--	- 1.2	--	--	390
Chile	19.0	17.2	4.3	5.9	- 3.5	-1.8	1.6	700
Colombia	16.2	17.7	3.7	3.7	- 3.4	1.5	0	480
Costa Rica	--	--	2.2	2.2	- 4.5	--	0	360
Ecuador	15.1	15.5	.04	.03	1.2	.4	- .1	197
El Salvador	10.4	10.7	.03	.003	8.9	.3	-.03	320
Guatemala	12.5	12.7	5.0	10.0	2.6	.2	5.0	95
Haiti	11.8	12.3	10.0	8.0	- .1	.5	-2.0	20
Honduras	11.4	12.9	8.3	9.8	- 1.7	1.5	1.5	57
Mexico	21.7	24.0	5.2	5.2	- 2.3	2.3	0	601
Nicaragua	11.5	13.1	1.3	1.5	- 2.7	1.6		240
Panama	10.3	11.9	--	--	-1 .9	1.6		750
Paraguay	17.7	17.6	.01	.01	.4	- .1		68
Peru	18.4	19.5	6.9	7.8	1.9	.9	.5	350
Uruguay	21.0	20.5	--	--	2.7	- .5	--	500
Jamaica	14.4	15.4	12.2	9.9	- .7	-1.0	-2.3	497
Surinam	--	--	--	--	--	--	--	353
Dominican Republic	--	--	--	--	--	--	--	340

South America (Continued)

	d	c	d	f	f	d	f	f	f
	Miles of Improved roads per 1000 sq. miles	Rail Mileage per 1000 sq. Miles	% of Pop. Working Age	Consumption % of GNP 1957	Consumption % of GNP 1963	Political Stability	Gov't % of GNP 1957	Gov't % of GNP 1963	Gross Capital Formation % GNP 1957
Argentina	74	27.7	64.9	82.2	77.3	3.40	8.5	8.4	18.3
Bolivia	30	34.6	56.1	--	--	1.70	--	--	--
Brazil	--	--	55.6	84.9	86.9	1.55	14.5	14.7	16.1
Chile	--	192	58.4	90.1	89.2	2.83	9.8	10.0	9.6
Colombia	57	54	54.3	80.5	82.6	2.43	6.1	6.7	22.2
Costa Rica	460	14	50.9	89.8	87.5	2.43	10.9	12.0	20.7
Ecuador	58	68	54.0	82.8	84.2	1.89	11.7	13.1	17.9
El Salvador	330	18.5	55.8	95.3	83.5	1.89	9.9	7.3	12.6
Guatemala	165	19.5	55.3	89.9	88.3	2.13	7.4	6.7	16.4
Haiti	--	17	57.8	98.3	--	1.55	10.7	8.7	5.7
Honduras	27	25	49.3	89.3	87.6	3.40	8.9	8.0	14.6
Mexico	71	193	52.2	87.1	86.5	4.25	4.6	5.6	18.6
Nicaragua	50	57	52.3	87.9	89.1	4.25	7.6	7.2	15.1
Panama	78	93	52.9	88.8	--	1.42	10.6	11.3	15.9
Paraguay	68	18.8	50.8	87.4	85.2	2.43	7.8	7.2	17.8
Peru	61	48	52.9	82.8	78.8	2.43	8.3	11.2	28.5
Uruguay	91	262	67.7	90.8	85.5	2.43	8.9	9.5	19.1
Jamaica	85	56	54.5	85.7	81.1	--	8.5	9.9	26.1
Surinam	80	--	51.1	--	--	--	--	--	--
Dominican Republic	236	55	52.6	90.1	105.5	5.67	17.1	20.9	18.4

South America (Continued)

	Gross Capital Formation % GNP 1963 [f]	No. of People Per Physician [a]	Investment as % of GNP [a]	Birth Rate [c]	Death Rate [e]	Exports & Imports % GNP 1957 [f]	Exports & Imports % GNP 1963 [f]	Const. % of 1957 GNP [f]	Services % of 1963 GNP [f]
Argentina	20.7	650	22	22.0	8.5	22.1	24.2	3.8	58.8
Bolivia	--	5270	11	44.0	21.0	51.2	46.2	.7	43.7
Brazil	13.5	2300	14	42.0	11.0	16.5	13.5	--	63.8
Chile	12.5	1600	12	35.0	11.5	21.7	26.7	3.6	63.5
Colombia	18.2	2500	19	42.0	13.0	31.9	27.9	5.7	41.5
Costa Rica	16.1	2300	15	30.5	8.5	45.0	45.6	3.9	49.2
Ecuador	14.0	2600	20	48.0	14.0	34.8	35.8	3.6	49.3
El Salvadore	11.7	4800	11	48.0	15.0	48.4	49.9	2.0	49.0
Guatemala	11.8	4800	14	33.9	19.0	27.4	31.1	2.5	53.3
Haiti	--	11000	--	47.5	22.0	27.1	20.9	1.2	58.2
Honduras	13.7	4800	15	48.5	16.0	39.3	39.9	4.2	39.1
Mexico	14.3	1310	17	32.9	10.5	24.7	21.9	3.3	60.1
Nicaragua	14.5	2700	16	48.6	15.0	43.2	46.8	2.9	46.0
Panama	17.1	2500	19	41.5	10.5	67.3	67.6	6.0	33.3
Paraguay	15.7	1800	16	40.7	13.0	35.7	32.9	2.3	42.1
Peru	22.6	1700	23	44	13.0	50.2	49.0	3.9	47.3
Uruguay	15.2	860	15	24	9.0	32.8	32.4	3.3	53.7
Jamaica	18.7	3700	--	--	--	70.2	69.2	10.4	50.0
Surinam	--	2420	--	--	--	--	--	--	--
Dominican Republic	8.6	4800	--	46	15	61.2	59.7	--	--

	a	b	c	a	e	d	f	f	i
	Money GNP 1957 $US	Money GNP 1964 $US	% of Population Rural	Ave[illegible] % Increase Population	Literacy Rate	Primary & Secondary Enrollment as % ages [5-19]	% of Labor Force in Agriculture	% of Gov Agriculture 1957	% of Gov Agriculture 1967
Algeria	178	225	70	2.5	18	24	65	26.7	16.9
Cameroon	105	125	--	1.3	10	31	--	48.1	49.8
Congo (Brazzaville)	92	80	76.9	2.3	38	51	84	30.5	29.8
Ethiopia	55	49	95	1.4	5	2	--	--	--
Ghana	172	251	--	2.6	23	28	70	--	--
Guinea	86	70	--	3.0	10	10	--	--	--
[illegible]	87	88	--	3.0	23	35	--	41.4	42.8
[illegible]	100	175	--	1.5	10	12	80	--	--
[illegible]	159	191	--	3.1	13	21	91	30.5	37.5
[illegible]ria	78	102	70	2.1	33	25	69	62.1	60.3
[illegible]desia	119	224	81	3.3	20	9	--	39.9	34.3
Rwanda	40	50	--	2.6	8	13	--	80.5	74.5
South [illegible] Rep.	477	527	--	2.4	43	39	47	--	--
Sudan	60	102	--	2.8	8	9	75	53.5	59.7
[illegible]isia	173	176	90	2.5	30	31	60	23.2	23.4
[illegible]	64	80	73	2.5	23	6	80	59.2	63.8

Africa (Continued)

	% of GNP Manufacturing 1957	% of GNP Manufacturing 1963	% of GNP Mining 1957	% of GNP Mining 1963	Change of Agriculture % of Total 1957-1963	Change of Manufacturing % of Total 1957-1963	Change of Mining % of Total 1957-1963	Power per Capita
Algeria	10.3	12.6	2.6	3.0	-5.8	2.3	.4	106
Cameroon	--	--	--	--	1.7	--	--	39
Congo (Leopoldville)	7.5	13.4	8.1	19.1	-2.6	5.9	11.0	158
Ethiopia	--	--	--	--	--	--	--	8
Ghana	--	--	--	--	--	--	--	82
Guinea	--	--	--	--	--	--	--	51
Kenya	9.6	9.4	.61	.32	1.5	- .2	- .29	56
Liberia	--	--	--	--	--	--	--	246
Morocco	13.5	13.4	6.2	6.2	3.4	- .1	0	100
Nigeria	3.8	5.8	1.0	1.7	-2.6	2	.7	24
Rhodesia	10.3	11.7	20.0	19.9	.4	1.4	- .1	849
Rwanda	2.4	2.9	1.2	1.0	-7.3	.5	- .2	4
South Africa, Rep.	--	--	--	--	--	--	--	1,001
Sudan	4.6	6.4	.1	.09	2.2	1.8	.01	13
Tunisia	13.3	13.9	2.5	1.7	-3.3	.6	- .8	77
Uganda	8.5	7.3	1.2	1.8	1.6	- .8	.6	20

Africa (Continued)

	d	e	d	f	f	d	f	f	f
	Miles of Improved roads per 1000 sq. miles	Rail Mileage per 1000 sq. Miles	% of Pop. Working Age	Consumption % of GNP 1957	Consumption % of [illegible] 196[illegible]	Political [illegible]	Gov't [illegible] of GNP 1957	Gov't [illegible] of GNP 196[illegible]	Gross [illegible] Formation [illegible] [illegible]
Algeria	--	2.9	55.4	98	96.6	--	3[illegible]	35.1	[illegible]
Cameroon	3	1.9	56.0	94.4	89.9	--	1[illegible]	15.5	[illegible]
Congo (Leopoldville)	--	3.5	54.4	74.1	70.5	--	15.[illegible]	17.[illegible]	[illegible]
Ethiopia	9	1.5	56.0	92.2	88.8	17	[illegible]	[illegible]	[illegible]
Ghana	100	8.3	52.3	87.1	76.7	4.3	[illegible]	[illegible]	[illegible]
Guinea	32	4.3	54.5	--	--	3.0	--	--	
Kenya	26	5.3	50.0	93.9	93.5	--	--	--	[illegible]
Liberia	33	7.1	56.0	--	--	17	--	--	
Libya	84	6.9	55.4	92.8	92.1	[illegible]	[illegible]	[illegible]	[illegible]
Morocco	--	3.1	52.3	92.0	90.1	--	[illegible]	[illegible]	[illegible]
Rhodesia	147	18.0	--	76.5	[illegible]	--	[illegible]	[illegible]	[illegible]
Rwanda	--	0	--	90.2	--	--	[illegible]	--	[illegible]
South Africa, Rep.	226	28.8	57.7	75.9	[illegible]	[illegible]	[illegible]	12.7	[illegible]
Sudan	2	4.1	51.3	92.7	[illegible]	[illegible]	[illegible]	9.6	[illegible]
Tunisia	100	66.2	54.6	97.8	89	[illegible]	--	[illegible]	[illegible]
Uganda	122	--	56.5	88.6	86.8	--	--	--	[illegible]

Africa (Continued)

	f	a	a	n	e	f	l	l	y
	Gross Capital Formation % GNP 1963	No. of People Per Physician	Investment as % of GNP	Wheat Yield	Cotton Yield	Exports & Imports % GNP 1957	Exports & Imports % Imports	Coal & Lignite GNP	Petroleum GNP
Algeria	26	13,500	--	48.5	33.0	110.2	50.5	6.4	59
Cameroon	--	24,300	--	49.9	25.7	93	45.2	9.6	41.5
Congo (Brazzaville)	13.2	63,400	--	—	—	28.7	51.0	5.8	62.5
Ethiopia	11.0	76,400	11	—	—	22.7	51.0	—	--
Ghana	23.4	13,200	19	49	24	54.9	54	--	--
Guinea	--	28,400	--	62	13.7	--	--	--	--
Kenya	10.2	9,700	12	50	30	48	93.0	1.6	1.0
Liberia	--	13,800	--	--	--	--	--	--	--
Morocco	11.2	10,800	11	46.1	16.7	50	1.1	1.1	2.0
Nigeria	11.4	27,100	13	67	13.5	35.0	1.4	2.5	1.0
Rhodesia	13.8	6,200	13	49.1	6.8	52.9	1.0	9.8	1.0
Rwanda	--	185,100	--	52	--	--		2.0	1.0
South Africa, Rep.	18.4	2,000	--	46.1	14.9	33.0		--	
Sudan	15.0	29,300	15	51.7	--	91.0	1.0	6.4	1.0
Tunisia	20.3	10,000	22	47.2	10	55.9	1	6.2	1.2
Uganda	8.8	15,900	11	26	20	48.5	1	3.0	1.3

Middle and Far East

	a	b	c	e	g	d	h	f	i
	Money GNP 1957 $US	Money GNP 1964 $US	% of Population Rural	Average % Increase Population	Literacy Rate	Primary & Secondary Enrollment as % ages (5-19)	% of Labor Force in Agriculture	% of GDP Agriculture 1957	% of GDP Agriculture 1964
Cyprus	467	555	73	1.0	82	55	50	—	—
Iran	108	220	69	2.5	18	24	80	27.5	26.9
Iraq	156	255	34	2.0	20	37	81	32.4	19.6
Jordan	129	233	--	3.0	38	46	33	—	—
Syria	173	155	65	3.0	35	31	70	42.8	37.4
Lebanon	142	150	--	3.0	30	33	64	34.2	27.5
[illegible]	129	144	85	3.0	75	60	53	47.7	47.2
[illegible]	73	88	82	2.4	24	29	71	48.1	46.5
[illegible]	70	82	87	2.6	20	20	65	54.9	52.8
Yemen	57	67	--	2.1	60	27	70	37.9	32.4
Cambodia	99	132	90	2.2	31	31	80	47.7	41.6
South [illegible]	144	118	70	2.9	85	52	70	37.6	40.8
Philippines	220	153	--	3.3	72	47	58	37.3	33.7
Thailand	96	113	--	3.3	68	46	82	39.4	39.0
South [illegible]	76	115	--	2.8	45	--	--	--	--
Afghanistan	50	85	--	2.0	8	4	85	—	—
Turkey	220	245	72	2.5	44	38	77	41.8	38.0
China (Taiwan)	161	189	75	2.8	78	59	--	31.5	29.3

Middle and Far East (Continued)

	f	f	f	f				f
	% of GNP Manufacturing 1[illegible]	% of GNP Manufacturing 1963	% of GNP Mining 1957	% of GNP Mining 1963	Change of Agriculture % of Total 1957-1963	Change of Manufacturing % of Total 1957-1963	Change of Mining % of Total 1957-1963	Power per Capita
Cyprus	--	--	--	--	--	--	--	564
Iran	16.5	17.2	12.1	11.4	- .3	.7	- .7	67
Iraq	7.6	9.5	21.0	37.6	-1.7	1.9	16.6	153
Jordan	--	--	--	--	--	--	--	74
Syria	--	--	--	--	-5.8	--	--	104
Egypt	--	--	--	--	-6.7	--	--	159
Lebanon	3.8	5.6	.08	.13	- .3	1.8	.05	59
India	--	--	1.2	1.2	-3.6	--	0	21
Pakistan	8.8	10.2	.19	.29	-3.9	1.4	.10	30
Burma	10.9	16.2	.85	.83	- .4	5.3	- .02	23
Cambodia	7.8	8.2	.56	.43	-6.1	.4	- .13	14
South Korea	9.8	12.3	1.7	3.1	-6.8	2.5	1.4	100
Philippines	15.9	17.5	1.8	1.5	-3.5	1.6	- .29	148
Thailand	10.9	11.2	1.7	1.6	-3.4	.3	- .1	524
South Vietnam	--	--	--	--	--	--	--	34
Afghanistan	--	--	--	--	--	--	--	14
Turkey	14.1	14.0	2.3	1.6	-1.8	- .1	- .7	142
China (Taiwan)	19.5	22.5	2.2	2.1	-4.7	3.0	- .1	680

Middle and Far East (Continued)

	a	c	d	f	f	d	f	f	b
	Miles of Improved roads per 1000 sq. miles	Rail Mileage per 1000 sq. Miles	% of Pop. Working Age	Consumption % of GNP 1957	Consumption % of GNP 1958	Political Stability	Gov't Exp. % of GNP 1957	Gov't Exp. % of GNP 1963	Press Control Restriction 1957
Cyprus	1035	0	58.6	93.0	93.6	—	19.9	31.9	22.7
Iran	21	3.7	53.8	86.5	76.7	1.24	—	—	17.3
Iraq	40	7.1	49.9	80.0	87.6	.69	10.5	11.8	23.2
Jordan	52	54.4	49.3	109.8	116.6	.84	27.7	23.7	30.6
Syria	66	5.1	58.0	--	--	.59	—	—	—
Egypt	35	--	58.6	88.3	99.7	1.31	—	—	14.1
Ceylon	829	45.9	57.4	84.1	83.3	2.80	15.8	13.7	16.7
India	243	27.8	59.0	86.6	85.8	—	6.1	8.7	13.3
Pakistan	52	19.2	51.9	95.2	99.4	1.75	—	—	16.3
Korea	60	8.7	63.6	84.2	79.8	2.00	12.2	11.1	21.3
Cambodia	40	3.6	53.1	—	—	.59	—	—	—
South Korea	400	22.1	54.6	98.1	99.9	—	16.3	11.1	17.1
Philippines	310	2.2	51.3	91.0	86.3	—	8.1	8.1	20.1
Thailand	40	10.9	55.3	92.5	79.5	1.47	9.1	7.1	15.0
South Vietnam	110	13.4	--	—	—	7.0	—	—	—
Afghanistan	110	--	56.0	--	—	5.64	—	—	—
Turkey	107	8.4	57.1	88.4	93.5	2.43	12.3	13.7	15.0
China (Taiwan)	600	68.8	52.4	88.3	82.7	17.0	16.3	17.6	19.5

Middle and Far East (Continued)

	f	g	a	c	e	i	f	k	j
	Gross Capital Formation as % of GNP 1963	No. of People Per Physician	Investment as % of GNP	Birth Rate	Death Rate	Exports & Imports % GNP 1963	Exports & Imports % GNP 1964	Debt, as % of GNP	Services % of Debt
Cyprus	19.7	1,400	20	24.2	6.6	54.7	68.3	—	—
Iran	16.9	3,800	—	37.8	8.2	31.7	36.5	3.2	41.2
Iraq	19.6	4,800	14	20.0	4.2	56.3	64.8	5.0	39.2
Jordan	14.2	4,700	14	45.5	6.6	53.9	59.8	—	—
Lebanon	--	12,700	--	--	--	55.4	63.1	3.9	65.7
Libya	--	2,900	--	--	--	33.6	37.0	2.3	65.0
Malta	14.1	4,600	13	33.1	8.8	66.8	82.5	7.3	39.7
Syria	16.4	5,700	16	38.4	12.6	14.7	12.2	19.0	36.0
Tunisia	11.6	7,300	17	43.4	15.6	19.7	23.1	9.7	74.6
Yemen	20.3	10,100	18	39.9	17.9	49.2	39.7	2.9	41.5
Kuwait	--	24,700	--	41.4	19.7	83.6	87.0	2.4	58.1
Saudi Arabia	19.5	2,700	14	44.7	16.0	21.7	24.5	3.0	43.2
Sudan	10.1	1,700	17	25.7	7.1	97.3	87.3	5.3	63.8
Egypt	21.2	7,300	21	46.0	13.9	41.3	38.4	—	—
South Viet Nam	--	28,300	--	28.4	5.7	—	--	--	--
Afghanistan	--	29,300	--	--	--	—	—	—	--
Turkey	14.0	2,000	15	--	--	13.5	16.6	5.2	38.8
China (Taiwan)	23.6	1,500	21	34.5	5.7	29.9	25.8	3.6	40.2

APPENDIX [illegible]

CORRELATION COEFFICIENTS OF FACTORS OBSERVED BUT NOT USED IN THE STUDY (REGIONAL)

Factor*	Region		
	South America	Africa	Middle and Far East
Average percent change of population over the period	.023	.146	.012
Political Stability	.298	.018	-.283
Change of Agricultural sector as a percent of GNP over the period 1957-1964	-.143	.112	-.333
Change of Manufacturing sector as a percent of GNP over the period 1957-1964	-.029	.321	-.276
Change of Mining Sector as a percent of GNP over the period 1957-1964	.100	-.021	-.052
Death Rate	-.215	-.111	-.376
Government as % total of 1963 GNP	.418	.357	.326

*These factors were compared only with the level of per capita gross national product.

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FACTORS IN ECONOMIC DEVELOPMENT:
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AN ABSTRACT OF A MASTER'S REPORT

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1968

The relationship between levels of human resource development and levels of per capita gross national product. From the list of factors chosen by the authors to indicate the level of human resource development, a composite index was constructed.

The composite index, which indicated the level of human resource development, was an arithmetic total of enrollment in secondary education (adjusted for different time lengths of secondary education in different countries) as a percentage of the population 15-19 and third level enrollment (enrollment in colleges and universities) as a percentage of its age group multiplied by a weight of five (the weight was arbitrarily chosen).

After constructing their index, Harbison and Myers used a simple correlation test to determine whether any relationship existed between their index and the level of per capita gross national product. The authors found that a quite significant correlation (.80) existed between their index and the level of per capita gross national product, indicating that increased human resource development was associated with higher levels of per capita gross national product.

The Hoover and Harris study, the third study reviewed in the report, concentrated on the role of noneconomic factors in explaining differences in per capita gross national product. In attempting to explain why different institutional and political systems were responsible for differences in income levels, the authors used factor analysis.

From their study, Hoover and Harris found that 86% of the differences in per capita gross national product could be explained by changes in attitudes and institutions, strength of the political system, character and nature of leadership and stability of social and political environment.

Using these two studies as a background, a brief empirical study was made to determine whether additional factors could be associated with different levels of per capita gross national product. The method used in the study to determine the existence of other factors and per capita gross national product levels was rank correlation.

The results obtained from the rank correlation indicated that a positive relationship existed between factors that indicated the existence of social overhead capital and the level of per capita gross national product. The results of the study also indicated that the agricultural sector made up a smaller percentage of total gross national product as gross national product rose. Manufacturing services, on the other hand, made up an increasingly greater percentage of gross national product as gross national product rose.

The conclusions drawn from the studies were that investments in social overhead capital may be important in the development process, institutions and institutional barriers may hinder development, and quality of the labor force may be a limiting factor in development. Finally, it was concluded that the role any particular factor plays in the development process will depend on the interaction of that factor with other factors existing in the economy.